PATRICK (J. J. R.)

# CIVILIZATION

NOT THE

# CAUSE OF TOOTH DECAY

An Essay

BY

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*Read before the Illinois State Dental Society, at their Eighteenth Annual Session, held in Quincy, on the 10th of May, 1882.*



TOGETHER WITH A SHORT DESCRIPTION OF AN

## Instrument for Regulating the Human Teeth.

Reprint from the Society's Transactions

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GENTLEMEN:—It is not too much to say that civilization, being a slow process of long and complex growth, can only be comprehended when studied through its entire range. The present cannot be properly understood without a knowledge of the past, and a knowledge of the whole is necessary to explain a part. Of late years the early history of man is felt to be an attractive subject, and a feeling of eager curiosity can be traced through the writings of most men who may have occasion to speak of the relations of man, not only with all other living creatures, but also with that part of creation which is devoid of life and which contributes largely to his sustenance. I regret to say that the recent literature produced by our own profession is not far behind others in the belief that facts are only useful to illustrate theories; and it seems as if the great complexity of the

question and of the conditions necessary to produce sound evidence, has had a tendency to beget acquiescence in that which is the most insufficient for scientific accuracy. There is a tendency to carry researches into the more abstruse questions connected with vitality, the nervous power, and the relations of mental and material phenomena; while such inquiries are justifiable in themselves, to be of scientific value they need to be treated with more than common caution as to testimony as well as the conclusions to be derived from them, yet it is here that such precautions are usually disregarded.

At the late International Medical Congress, Dr. Norman Kingsley read a paper on civilization in its relation to the "Increasing Degeneracy of the Human Teeth," and attributed it to an increase of nervous diseases correlated to high civilization. Mr. Mummery, L. D. S., also read a paper on the subject of caries before the same congress, in which he is reported to have made the assertion, that "in the stone age caries and irregularities of the teeth of man were unknown, but as iron and other metal instruments, indicative of the increase of knowledge and art, came more and more into use, so did those diseases become apparent and increase in frequency." In a little work entitled, "Practical Information about the Teeth" recently published under the auspices of the Dental Society of the State of Wisconsin, I find the following remarkable passages:

"The Creator has provided everything to meet the wants of every part of the body, the bones and the teeth not excepted. The teeth of wild animals, of uncivilized tribes, and of all people who live in accordance with nature, are witnesses to this fact; and the teeth of domesticated animals and of nearly all *civilized nations*, or those beings who are living artificially, demonstrate their unnatural tendency to early loss. *Those nations who best observe the laws of nature enjoy the best physical development, the best teeth, and the highest mental power.* Thus, in Scotland, where great attention is paid to proper diet, and where the bone-producing elements in food are used most freely, there are fine teeth, healthy bodies, and high intellectual resources." (1.)

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(1). In this connection the testimony of Robert Burns, Scotland's greatest bard, will not be out of place to show the existence of decayed and aching teeth in Scotland. Burns died in the year

Therefore, the conclusions arrived at by this author are, that wild animals and uncivilized tribes, together with those nations who

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1796, in his thirty-eighth year, and his poem "Address to the Toothache," was written some ten years previous, soon after he had been tormented by that disorder :

ADDRESS TO THE TOOTHACHE.

My curse upon thy venom'd stang,
That shoots my tortur'd gums alang ;
And thro' my lugs gies monie a twang
Wi' gnawing vengence,
Tearing my nerves wi' bitter pang,
Like racking engines !

When fevers burn, or ague freezes,
Rheumatics gnaw, or colic squeezes,
Our neighbor's sympathy may ease us
Wi' pitying moan ;
But thee—thou hell o' a, diseases,
Aye mocks our groan !

Adown my beard the slavers trickle !
I throw the wee stools o'er the mickle,
As round the fire the giglets keckle
To see me loup ;
While raving mad, I wish a heckle
Were in their doup.

O' a' the num'rous human dools,
Ill har'sts, daft bargains, *cutty stools*,
Or worthy friends rak'd I' the mools,
Sad sight to see !
The tricks o' knaves, or fash o' fools,
Thou bear'st the gree.

Where'er that place be priests ca' hell,
Whence a' the tones o' mis'ry yell,
And ranked plagues their numbers tell
In dreadful raw,
Thou, Toothache, surely bear'st the be
Amang them a' !

O, thou grim mischief making chiel,
That gars the notes of *discord* squeel,
Till daft mankind aft dance a reel
In gore a shoe-thick—
Gie a' the foes o' Scotland's weal
A towmond's toothache !

After cursing, describing and comparing the torments of an aching tooth he concludes the poem in a fit of patriotism by calling on the devil ("Grim mischief-making chiel,") to

"Give all the foes of Scotland's weal
A twelve-month's toothache !"

Now, when Burns penned this address he knew that his countrymen would not only understand, but fully appreciate it ; for it is the duty of a poet "to hold the mirror up to nature," and no man performed that obligation more faithfully than Burns.

enjoy high intellectual resources, bone-producing food, and exercise, have good teeth. That there may be no mistaking the author's meaning on this question, I will again quote from page 20, which says: "The unpleasant fact is forced upon all thinking people, that the *modern manner* of living has interfered with the whole plan of nature and changed the whole course of life." And on page 21: "Whoever has seen ancient skulls, or looked into the mouths of modern people who live according to nature, may have noticed the perfect condition of their teeth."

Now, therefore, Dr. Kingsley, Mr. Mummery, L. D. S., and Dr. Arthur Holbrook, (the author of Practical Information) may be placed in the same category with a number of other doctors as the advocates of hypotheses which may be be reduced to the following syllogism:

> If we lived in a state of nature we would have good teeth
> Savages or uncivilized tribes live in a state of nature,
> Therefore Savages have good teeth.

Now, if the major and minor propositions of this statement are correct, the conclusion must be inevitable. It will therefore be necessary to a proper understanding of the question to ascertain if possible what is the true signification of living in a state of nature, and this once understood we will then be able to comprehend what is meant by living in a state of civilization.

If living in a state of nature means to be without all the artificial contrivances and conveniences which go to make up our present condition, then there is not a savage that has yet been discovered so low in the scale of humanity as to be truly said to be living in that natural condition, for the lowest savages yet known on the face of the earth have made some progress towards clothing or ornamenting themselves. No savage lives in harmony with the laws of nature; on the contrary, it is his ignorance of those laws that makes him a savage, and it is only in proportion as man understands his surroundings—understands the laws that govern his existence, and uses them to his advantage, *and in that proportion only*, does he become civilized. But the laws which govern nature are far from being understood, and it is a question that often arises—is it desirable to copy nature?

When nature does her work well, then, and only then can it be desirable. For there is a redundancy or an insufficiency in most things that nature does, material constantly getting into places where it is not needed, and leaving other places where it would be of service. Constantly exceeding the bounds of uniformity—a dead calm followed by a terrific cyclone, exceedingly hot, or intensely cold, a terrible drouth, and a deluge of rain, a season of plenty and a period of famine. And this state of things exists, not only in the physical world, but in the region of thought. There are periods in history prolific in the production of great minds. The age of Elizabeth furnished the greatest poets, philosophers, and heroes the world has ever seen—Shakspeare, Massinger, Decker, Beaumont, Fletcher, Milton, Bacon and Raleigh; followed by a period of mental inactivity.

Our good old mother Nature, who is so constantly held up as a model of perfection, is full of impropriety, indecorum and loose, ness, combined with a fearful amount of strength to restrain her children, but she leaves them to do pretty much as they please-trusting to time and hard knocks among themselves to teach them wisdom, prudence, primness and propriety.

There is an eternity of the past for man as well as of the future; take all from him that he has acquired through the countless ages of his struggle for existence, and he would be naked and defenceless; unprovided with hair to cover his naked and tender skin, he could not move from place to place with any degree of comfort, but would have to confine himself to some warm portion of the globe. Even if he possessed the brains of a Newton, they would only serve to intensify his wretchedness, for he would still be a cowering helpless savage, feeding on the dead carcasses of fishes, reptiles, birds and quadrupeds, the leavings of other animals that were better provided by nature with fangs and talons to supply themselves with food. But the poet informs us that "God tempers the wind to the shorn lamb;" this is a beautiful sentence, but simply the negative of the true picture, for the lamb must be tempered to the blustering wind; universal laws do not change to accommodate individuals, the individuals must accommodate themselves to the laws or perish. That which is beautiful in poetry and attractive in fiction may be false in physics. Man has been defined as a cooking animal to distinguish

him from all others, but there was a time in the history of man when he had not discovered the use of fire. He has also been defined as "an animal that works with tools," but there was a time in his history when he had no tools to work with; he had to make them; tools are not natural productions. The progress from a natural state to a more civilized condition has been very, very slow. Gourd husks and cocoa-nut shells were used long before the invention of pottery; bone and stone implements before bronze and iron; terms for the lower numerals before the higher—twos, fives and tens, before hundreds, thousands and myriads. Man had to learn to count his fingers and toes before he could master abstractions.

Man receives all his impressions of the external world through his special senses, and nature has endowed the special senses of man with all that is necessary for a superior brutal existence; but the civilized or cultivated man, the man of scientific attainments, knows from long experience that they can not be trusted. A very slight thing affects them; a little congestion of the liver turns them into cheats; an undigested piece of beef distorts the vision; an under-done vegetable lodged in the stomach will disturb the brain and nervous function to such a degree that unsubstantial ghosts and hideous nightmares appear as most substantial truths; so, if *I* needed exact counsel, either in medicine or theology, I would first require to be informed of the condition of my counselor's stomach. It is generally conceded that man, either savage or civilized, is a vertebrate animal provided with teeth, and whatever food his environment may compel him to use, his teeth are employed to prepare it for his stomach; and wherever man has been discovered he has been found to be in possession of these necessary organs, for the same reason that birds have feathers. I have never seen, in any of the works on natural history or travel that I have read, a statement to the contrary, and I have never heard the most zealous advocates of unbolted flour and graham bread—even at times when their culinary enthusiasm appeared to be boiling over while they were rearranging the modern pantry–say one word about a savage people becoming edentulous through neglecting to adopt their system of dietetics. Yet there are savages who are complete strangers to cereal plants, *and if such savages have good teeth*, it cannot be attributed to the use of cereal grains, either in a prepared or unprepared condition.

In this connection a few selections from the "Descriptive Sociology, or, Groups of Sociological Facts," classified and arranged by Herbert Spencer, and from other sources, may throw some light on the value of dietetics:

"The Esquimaux are exclusively an animal-feeding people; their food consists of reindeer, musk-ox, walrus, seals, birds and fishes."—*Sir John Lubbock's Pre-Historic Times, page* 428.

"Our journeys have taught us the wisdom of the Esquimaux appetite and there are few among us who do not relish a slice of raw blubber or a chunk of frozen walrus beef. In value it is far above the same weight of pemmican."—*Dr. Kane's Arctic Explorations, vol.* 2. *page* 15.

Greenlanders. — "The choice dish of the Greenlanders is the flesh of the reindeer, but as these animals have become very scarce they are indebted to the sea for their permanent sustenance, seals, fish and sea-fowl. On the capture of a seal the wound is immediately stopped up, to preserve the blood, which is rolled into balls like force-meat. Parts of the seal are preserved under the grass in summer, and a whole seal is buried under the snow in winter. The flesh half-frozen and half-putrid is eaten by the Greenlanders with the keenest appetite and is called mi-ki-ak."—*Simond's Curiosities of Food, page* 32.

Icelanders. — "The diet of the Icelanders consists almost solely of animal food; fish, either fresh or dried, forms by far the largest proportion. During the summer they have milk and butter in considerable abundance, but of bread and every other vegetable food there is the utmost scarcity."—*Mackenzies' Travels in Iceland, page* 407.

Siberia, Lower Kolyma. — "Their food consists of fish or reindeer meat boiled, or fried in train-oil. As an occasional delicacy they have baked cakes of fish roe, or of dried and finely-pounded muksuns, which are the substitutes for meal. Bread is everywhere rare."– *Wrangle's Expedition to the Polar Sea, page* 74.

The Jakuts.— "Their food consists of beef and horseflesh, sour cow's milk and mare's milk. They boil their meat, but never roast or bake it, and bread is unknown among them. Fat is their greatest delicacy. They eat it in every possible shape—raw, melted, fresh, or spoilt. In general they regard quantity more than quality in their food. They prepare from cow's milk

what is called jakut butter. It is more like a kind of cheese, or curd, and has a sourish taste; it is not very rich, and is a very good article of food eaten alone." (In fact it is schmierkäse.)—*Wrangle's Expedition to the Polar Sea, page* 23.

North American Indians.—"The buffalo meat is the great staple and staff of life in this country (Mandans of the Upper Missouri), and seldom, if ever, fails to afford them an abundant and wholesome means of subsistence. They live almost exclusively on the flesh of these animals through every part of the year."—*Catlin's North American Indians, vol.* 1, *page* 122.

Indian Tribes of the Interior of Oregon.—"They all prefer their meat putrid, and frequently keep it until it smells so strong as to be disgusting. Parts of the salmon they bury under ground for two or three months to putrefy, and the more it is decayed the greater delicacy they consider it."—*Wilk's U. S. Exploring Expedition, vol.* 4, *page* 452.

Mexico.—The Indians of New Spain.—"Those subject to the European domination generally attain to a pretty advanced age. As peaceable cultivators and inhabitants of villages, they are not exposed to the accidents attending the wandering life of the hunters and warriors of the Mississippi and the savannas of the Rio Gila. These people live on an almost entirely vegetable food, their maize and cereal gramina."—*Taylor's selections from Humboldt's works relating to Mexico, page* 67.

"The usual food of the laboring classes throughout such States as I have visited, is the thin cake of crushed maize, named tortilla; and it is remarkable that, notwithstanding the great abundance of cattle in many places, the traveler can rarely obtain meat in the little huts which he finds on his road. A few fowls are at times to be seen wandering near the cottages, or some pigs rambling through the village, and the flesh of these creatures is only used to furnish a feast on holidays."—*Lyon's Residence in Mexico, vol.* 2, *page* 244.

Pampas Indians.—"The Indians of whom I heard the most were those who inhabit the vast unknown plains of the pampas, and who are all horsemen, or rather pass their lives on horseback. The life they lead is singularly interesting. In spite of the climate, which is burning hot in summer and freezing in winter, these brave men, who have never yet been subdued, are entirely

naked, and have not even a covering for their heads. They live together in tribes, each of which is governed by a cacique; but they have no fixed place of residence. Where the pasture is good, there they are to be found until it is consumed by their horses. They have neither bread, fruit nor vegetables, but they subsist entirely upon the flesh of their mares, 'and the ground is the bed on which, from their infancy, they have always slept.'"—*Sir Francis Head's Journeys Across the Pampas, page* 120.

Guachos.—"We find a people living between the twentieth and fortieth parallels of latitude, in the Argentine Republic, known as Guachos (half-white inhabitants of the pampas). They are a mixed race of Indian and Spanish blood, who are employed at the ranches or great cattle stations, and spend the greater part of their time on horseback, in hunting the half-wild cattle which roam over the grassy plains extending from the Atlantic coast to the foot of the Andes. These people live entirely on roast beef, with a little salt, scarcely ever tasting farinaceous or other vegetable food, and their sole beverage is maté, or Paraguay tea, without sugar."—*Odontology Society Transactions, vol.* 2., *new series, page* 44.

The Natives of Australia.—"Amongst the almost unlimited catalogue of edible articles used by the natives of Australia, the following may be classed as the chief: All salt and fresh water fish, and shell fish, of which in the large rivers there are vast numbers and many species; fresh water turtles, frogs of different kinds, rats and mice, lizards and most kinds of snakes and reptiles, grubs of all kinds, moths of several varieties, fungi and many sorts of roots, the leaves and tops of many plants, various kinds of fruits and berries, the bark from the roots of many trees and shrubs, the seeds of leguminous plants, gum from several species of acacia, different sorts of manna, honey from the native bee, and also from the flowers of banksia by soaking them in water, the tender leaves of the grass tree, the larvæ of insects, white ants, eggs of birds, many kinds of kangaroo, opossums, squirrels, sloths and wallabies, ducks, geese, cockatoos, parrots, wild dogs and wambats," and in fact everything that he can strike with his boomerang or seize with his hands or teeth.—*Eyre's Central Australia, vol.* 2, *page* 250.

New Zealand.—The food of the natives consists of sweet

potatoes, aromatic berries, the pulp of the fern tree, the heart of a palm-tree and many different berries. Of animals they consume fishes, dogs, the indigenous rat, crawfish, birds and guanas. Fish, however is the principal food of the inhabitants, and the roots of the fern are to the people what bread is to the inhabitants of Europe."—*Dieffenbach's Travels in New Zealand, vol.* 2, *page* 17.

The natives of the Friendly Islands, of Otaheite, Feejee, Tanna (one of New Hebrides), New Caledonia, Island of Savu (between Australia and Java), and the inhabitants of the Sandwich Islands, all live on a mixed diet, varied only by the conditions which surround them.

China.—"The Chinese have no prejudices whatever as regards food; they eat everything and anything from which they can derive nutrition. Dogs, rats, mice, monkeys, snakes, sea-slugs, rotten eggs, putrefied fish, unhatched ducks and chickens. Both in eating and drinking the Chinese are temperate, and are satisfied with two daily meals; rice about 10:00 A. M., and rice at 5:00 P. M. The only repugnance I have observed in China is to the use of milk. I never saw or heard of butter, cream, milk, or whey being introduced at a Chinese table."—*Bowring, in Statistical Society Journal, vol.* 20, *page* 47.

Japan.—"Japan surpasses most countries hitherto known to us in the multiplicity of the articles of food to be met with in its islands and the surrounding ocean. Rice, which is here exceedingly white and well-tasted, supplies with the Japanese the place of bread; they eat it boiled with every kind of provisions. Miso soup boiled, with fish and onions, is eaten by the common people, frequently three times a day, at each of their customary meals. Misos are not unlike lentils, they are small beans and are gathered from the *Dolichossoga*. Fish is a very common dish with the Japanese, both boiled and fried in oil. Fowls, of which they have a great variety, both wild and tame, are eaten in great abundance, and the flesh of whales, though coarse, is in several places, among the poorer sort, a very common food. In their victuals they make a very plentiful use of mushrooms, egg-apple, carrots, and several kinds of bulbous roots and beans. Oysters and other shell fish, shrimps and crabs boiled or stewed, are also eaten."—*Thunburg's Travels, vol.* 4, *page* 35—1705.

India.—"From the earliest period the most general food in

India has been rice, which is still the common food in nearly all the hottest countries in Asia. It is not, however, so much used in the south of Hindostan as formerly, and has been replaced by another grain, called ragi."—*Buckle's History of Civilization, vol.* 1, *page* 64.

"The principal food of the people of Hindostan is wheat, in the Deccan, Jowár and Bájra; rice as a general article of subsistence, is confined to Bengal, and part of Behár, with the low country along the sea all around the peninsula. In most parts of India wheat is only used as a luxury."—*Elphinstone's History of India, vol.* 1, *page* 12.

Ceylon.—"The ordinary diet of the people is very meagre, consisting of rice seasoned with salt, the chief condiment of the East, and a few vegetables flavored with lemon juice and pepper. Beef is forbidden, being an abomination. The hondrew class are rather more luxurious, eating from five to six sorts of food, one or two of which consist of meat or fish. Their chief food, however, is rice, the other dishes being used principally for a relish."—*Pridman's Ceylon, vol.* 1, *page* 263.

The endless cocoanut forests in Ceylon provide the natives, with the most important article necessary for supporting existence.

Egypt.—"Beef and goose constitute the principal part of animal food throughout Egypt. Vegetables form the principal food of the lower orders, and lentils are the chief article of diet."—*Wilkerson's Ancient Egypt, vol.* 2, *page* 368.

Sahara.—"Dates are not only the principal growth of Fezzan oasis, but the main subsistence of the inhabitants. All live on dates—men, women and children, horses, asses and camels, sheep, fowls and dogs."—*Richardson's Travels in the Great Desert, vol.* 2, *page* 323.

Nubia.—"We have another example of a race subsisting entirely upon animal food in the Arabs who inhabit the Nubian desert—a district which consists principally of hills, varying from 1,000 to 1,800 feet high, and is destitute of all vegetable products suitable for human food. Their camels subsist on the thorny shrubs growing among the rocks; and the milk and flesh of these animals (with salt) constitute their sole ordinary food."—*Odontological Society Transactions, vol.* 2, *new series, page* 45.

Abyssinia.—"An instinctive feeling dependent upon the pleasures of a state of warmth has taught the Abyssinians, that the flesh of animals eaten raw is a source of great physical enjoyment by the cordial and warming effects upon the system produced by its digestion. The eating of raw meat, however, is considered a luxury, and is only indulged in at festivals. They are great meat-eaters, however, and suffer greatly in their health from the difficulty of obtaining salt."—*Johnston's Travels in Southern Abyssinia, vol.* 2, *pages* 175, 226.

Dahomey.—"The food of this people is simple, consisting of messes of meat and vegetables, mixed with palm oil and pepper, with which is eaten a corn cake called kanke."—*Forbes' Dahomey and the Dahomans, vol.* 1, *page* 29.

The Warari—"Are small and shriveled black savages. The principal articles of diet are milk, meat, and especially fattened dog's flesh, of which the chiefs are inordinately fond, maize, holicus and millet. Rice is not grown in these arid districts."—*Burton's Lake Regions of Central Africa, vol.* 2, *page* 273.

Wamrima or Coast Clans.—"Their food is mostly ugali, the thick porridge of boiled millet or maize flour, which represents the staff of life in East Africa. They usually feed twice a day, in the morning and at nightfall. They employ the cocoanut extensively; like the Arabs of Zanzibar, they boil their rice in the thick juice of the rasped albumen kneaded with water, and they make cakes of the pulp mixed with the flour of various grains."—*Burton, vol.* 1, *page* 35.

East Africans.—"The principal articles of diet are fish and flesh, grain and vegetables; the luxuries are milk and butter, honey, and a few fruits, as bananas, guinea-palm and dates. The Arabs assert that in these latitudes vegetables cause heart burn and acidity, and that animal food is the most digestible. The Africans seem to have made the same discovery. A man who can afford it almost confines himself to flesh, and considers fat the essential element of good living."—*Burton, vol.* 2, *page* 280.

Cabango.—"The chief vegetable food is the manioc and lotsa meal. These contain a very large proportion of starch, and when eaten alone for any length of time produce most distressing heart-burn, as we ourselves experienced in coming north. I now discovered that when these starchy substances are eaten along

with a proportion of ground nuts which contain a quantity of oil, no injurious effects followed."—*Livingston's Travels and Researches in South Africa, page* 455.

Kaffirs.—"The principal diet of the Kaffir is milk, which he eats rather than drinks, in a sour and curdled state. One good meal a day taken in the evening, consisting of the curdled milk and a little millet, is almost all that he requires, and with this he is strong and vigorous, proving that large quantities of flesh food are by no means necessary for the sustenance of the human frame."—*Simond's Curiosities of Food, page* 39.

Bosjesmans.—"The African bushmen, who have but few or no cattle, live upon what they can get. Hunger compels them to eat everything, roots, bulbs, the core of aloes, gums, berries, the larvæ of ants, lizards, locusts, grasshoppers, all are devoured by those poor wanderers of the desert. Nothing comes amiss to them."

Hottentots.—"The food of the Hottentots is the flesh and entrails of cattle; they boil them in blood if they have any, to which they sometimes add milk, and this they look upon as a glorious dish. They have no set times for meals, they eat all sorts of fruits and roots."—*Kolben's State of the Cape of Good Hope, page* 200.

Europeans.—What has been said of the dietaries of the many peoples who inhabit the earth may be truly affirmed of the Europeans; they use everything and anything that will support life. The dead carcasses of animals are raked from the cess-pools and gutters of their cities, the soft parts are submitted to a chemical process by which the fat is extracted, and eventually takes its place by the side of butter in the European pantry. Gelatine is extracted from the bones and is used in the manufacture of preserves, and the residuum of the animals goes to manure the ground. All parts of animals are eaten in some form or other. Snails, frogs and the flesh of horses are esteemed great luxuries by the *bons vivants* in some parts of Europe. The brains, blood and viscera are eaten as well as the flesh. They use milk of ruminants in large quantities, and make many kinds of cheese from the curd, pressed into many forms, which keep for a long time. Many of these people eat, from preference, the old cheese which is far advanced in decomposition and full of the larvæ of insects,

and esteem it a luxury. Others roll the curd into balls and expose it to the hot sun until it is partially decomposed, and other tribes form it into small bricks and bury it in manure till it ferments and commences to decay, as the Indian tribes of the interior of Oregon treat fish, and the more it smells, and the stronger it tastes, the greater delicacy they consider it. They make and use large quantities of intoxicating drinks, and are dotingly fond of tobacco, which they not only smoke like the Indians and Turks, but chew it incessantly, and draw it up their nostrils in fine powder. They have great abundance of vegetables, and cultivate all manner of cereal grains, wheat being the principal; fruits and roots they have of great variety, and that which they have not themselves they bring from great distances by the ingenious use of fire and water, which, producing steam, has put the products of the Orient into the markets of the Occident. One of their greatest achievements by the use of steam is their power of moving from place to place, and it is one of the most important, for it not only brings remote regions of the earth into proximity, but it actually in a sense, bridges over the great gulfs of time.

Thus it is seen that instances are to be found where life is sustained upon a wholly vegetable and a wholly animal, and a mixed diet; and that there is a great diversity as regards the kinds of food consumed by man in different parts of the earth. Now the elementary bodies, to be of service as food, must be in that state of combination known only in living organisms, for animal life cannot be sustained on inorganic matter; and the question of food and its preparation among all peoples appears to be no factor in the production of diseased teeth any more than other diseases, *for that which will support life must replenish the waste of all the organs of the body*, and no article can, as food, satisfy the requirements of life that fails to comply with this condition.

If we examine the many animal organisms around us, we shall find that some are designed to subsist exclusively on animal food, others on vegetable, and others on a mixed diet. Now, as the digestive apparatus in general of these three classes of animals is very different, and as the construction of the teeth is in conformity with the digestive apparatus, there is little difficulty in assigning man to his proper class. He has, from these considera-

tions, been assigned by comparative anatomists, to that class of animals designed in the general plan of nature to subsist on a mixed diet, and he is, in common with all other animals so constructed, capable of sustaining life on a wholly vegetable or wholly animal diet; and such is the case with all animals that live upon roots and fruits—their teeth and alimentary canals are similar. Now the question arises, who are the savages, and who are the civilized? Where are those people whom we have heard so much spoken of who live in a state of nature, and "whose teeth fairly glisten?" (To use the expression of the Milwaukee authority.) 'Tis a question of teeth and food; a question of whether the teeth of the present period are in a worse condition than in former times.

> Whether 'tis the effect of food we eat
> That makes our teeth look like our meat.

I have shown that the food of the so-called savages who live on a mixed diet, differs but little from the so-called civilized people. The Australian and the Chinese may consume a few more reptiles than the Europeans, and while their kitchens and larders may be somewhat different, the elements contained in *their* food which go to form the constituents of the body, cannot be considered essentially different from ours, any more than the air they breathe or the water they drink is different. In the little pamphlets issued from time to time designed as practical information for the people, we are told, on one page, of the perfect condition of the teeth of ancient skulls; and a few pages further on, strange and inconsistent as it may appear, we are again informed that Herodotus noticed and described various dental operations in Egypt 450 B. C., and as though this were not enough to prove the antiquity of the profession and contradict the former statement, the "tombs of Egypt, the temples of India, the sarcophagi of Greece, and the ruins of Pompeii are explored and made to give up their interesting specimens of primitive dentistry, which together with teeth well filled with gold in the mouths of Egyptian mummies, are preserved and can be seen in museums." But unfortunately the authors fail to inform their readers where such skulls can be found or where such interesting specimens of primitive dentistry can be seen. Now in order that this question

of comparative tooth decay may be settled, I respectfully suggest that the collections of skulls contained in the following museums be examined, classified and tabulated:

The collection of the Ethnological Department of the Smithsonian Institution, Washington, D. C.

The Museum of Anatomy and Surgery, Washington, D. C.

Museum of Natural History, Philadelphia, Pa. In this museum may be seen the large collection of human crania from every portion of the globe, collected and arranged by Dr. Samuel George Morton, author of Crania Americana and Crania Egyptica.

The Peabody Ethnological Museum, Cambridge, Mass.

The Abbot collection of Egyptian antiquities, Historical Rooms New York City, and a small private collection at Belleville, Ill., containing nearly one hundred pre-historic skulls, taken from the mounds of the American Bottom, in which it is the exception to find a set of sound teeth. Now I hold it to be inexcusable for gentlemen to draw upon their imaginations for facts when there is so much material accessible.

Much of the early history of the decay of the human teeth and of the art of dentistry I have in manuscript, but a few selections in this connection will not be out of place. Statement of Herodotus literally translated from his second book "Euterpe." —"The art of medicine is thus divided among them (the Egyptians); each physician applies himself to one disease only, and no more; all places abound in physicians; some physicians for the eyes, others for the head, *others for the teeth*, others for the parts about the belly, and others for internal disorders."*

This is the only statement made by Herodotus in regard to the human teeth, no mention whatever in regard to the manner in which the Egyptians treated diseases of any kind. The art of medicine was divided among the priesthood as in later times, and as their priesthood consecrated dogs, crocodiles, cats and onions, their art in medicine could not have been of a very scientific character, as we understand it. Further, they had not advanced beyond the use of bronze and picture writing in the

* "Jam vero medicina apud eos hunc in modum est distributa, ut singulorum morborum sint medici, non plurium, itaque omnia referta sunt medicis. Alii enim sunt oculorum, alii capitis, alii dentium, alii alvi partium, alii morborum occultorum."—Herodoti Halicarnassei historia Euterpe.

time of Herodotus, and could, therefore, not have worked gold as we are capable of doing with our steel and iron.

In the Abbott collection there are many specimens of Egyptian jewelry made from native gold, turquoise, and other gems, rude in construction, so much so that the commonest dollar jewelry of the present period far surpasses it both in variety of design and workmanship. I find it recorded in the annals of Tacitus, that Germanicus, being informed of a revolt in the Roman army in the Belgic provinces, set out without delay to appease the tumult. "He was, however, no sooner within the lines than the camp resounded with groans and bitter lamentations. Some laid hold of the prince's hand as if going to kiss it, but inserting his fingers in their mouths, made him feel their boneless gums, complaining that they had lost their teeth in the Roman service." *

Thus it is seen that our "Belgic sires of old," as well as their descendants, were subject to the premature loss of their teeth.

Among the epigrams of Martial, the Latin poet, who flourished in the first century of our era, I find the following reference to artificial teeth (such as they were) "You are not ashamed, Laelia, that you use teeth and hair which you have purchased ('fine bought teeth'). What will you do for an eye? That cannot be bought!" †

There is a disease of the bones known as rachitis, which is produced by a failure to secrete lime and magnesia, or, if secreted, not in sufficient quantity to give stability to the bones. This is a disease of childhood.

There is another disease of the bones called mollities ossium, in which the repair of the earthy matter of the bone is not equal to the waste. This is a disease of old age. Now, in either of these diseases whatever may be the primary cause, they are clearly due to a want of assimilation or defective nutrition, in which the calcium and magnesium taken into the body with the food, are not appropriated, but thrown off with the excreta of the body. It is, therefore, very clear that it would be useless to

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* The works of Cornelius Tacitus: Translated by Arthur Murphy, Esq.: Book 1st, chapter 34.

† Dentibus atque comis, nec te pudet, uteris: Quid facies oculo, Laelia?—Non emitur. Epigr XXIII., Lib. XII.

administer these salts in the hope of building up a wasting bony tissue, if these salts were found in abundance in the excretions of the body. *

Now, if calcium and magnesium were not found in the excretions of the body, these substances would, without a doubt, be indicated; but in administering these substances, or more properly, those foods which contained the largest proportion of the protein compounds, in which these earthy salts are locked up in a form suitable for appropriation by the animal economy, it could not be expected that they would go direct to any special bony tissue, much less to a series of organs like the teeth, the vitality of which is so far below the standard of other bony tissues. †

From these considerations how futile the effort must appear for individuals to elaborate theories derived in part from the whisperings of fancy and their own private practice, in support of the possibility of improving the condition of the teeth by a system of dietetics based simply upon what they see and unsupported by collateral knowledge. ‡

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* Though phosphate of lime is always found in the urine of adults, this salt is not present in the urine of infants. The rapid formation of the bones, in the first periods of life, requires all the phosphoric salts contained in the food of the infant, and nature, ever provident, has devised accordingly, for the milk of all mammals is richer in these salts than any other kind of food. Is it not strange that the advocates of "*feeding the teeth*" should have selected wheat bran or graham flour, as the great regenerator of "degenerated teeth?"

† After a tooth has once attained its growth, there is no evidence that repair and waste continues as in other portions of the body by a process of intussusception. Secondary dentine or cementum may be deposited as in old age, or when a tooth becomes abraded, diseased, or fractured, but these kind of growths take place either internally (as in the pulp cavity) or externally (as in exostosis), and not from the inmost substance or parenchyma of the tooth, but upon the surface, internal or external, and partake more of the character of concretions than secretions.

‡ In an article entitled "Food for the Teeth" which I find in the *Dental Office and Laboratory* of April, 1882, the author states that he saves the teeth he extracts from day to day, and works them over for future use in the mouths of other individuals. (A system of robbing Peter in the hope of paying Paul.) He dissolves the teeth thus obtained in a proper menstruum, then precipitating the lime salts from the liquid he washes the precipitate and evaporates to dryness. The lime salts thus prepared, with the addition of syrup to make it palatable, he administers to his patients in proper doses. He further informs his readers that he feels satisfied from results plainly observable, that his patients have received invaluable benefit from such treatment. And thus we have presented to our view in the nineteenth century, a dentist masquerading in the robes of a mediæval physician when cornu ustum was considered an infallible remedy in all diseases of the bones where earthy matter was supposed to be deficient.

*Pilus canis, suum morsum curat.*

It will now be in order for some first-class thoroughbred theorist to propose a cure for Alopecia, by the judicious use of properly prepared desiccated hair.

RESUME.

As there is a wide spread belief among the medical as well as the dental profession, that the teeth of man degenerate in proportion as he advances from a savage to a civilized condition; and as the literature of our own profession, when treating of the causes of the decay of the teeth, invariably attributes it to "physical degeneracy consequent upon his artificial mode of living," it is certainly time that they who rely upon this hypothesis as an explanation of disease, be called upon to furnish not only opinions and inferences, but proofs of a conclusive character for their assertions.

Now, in order to facilitate the investigation, I will submit the following inquiries:

1st. Are people more subject to nervous diseases now than formerly? and if so, do such people suffer more from diseases of the teeth than those people who are not so afflicted? Man in a barbarous or uncivilized condition, acts upon impulse, whereas the civilized man reflects before he acts, for it is only by the exercise of this reflective quality in man that he becomes civilized, and the shortness and misery of savage life must be taken into account in making up statistics on this subject. *

2d. Are diseases of the teeth more common now than formerly? Ancient and modern history, poetry and old works on medicine, record diseases of the teeth, as well as supplying their loss by artificial means. Pre historic skulls should be examined and tabulated; and to be of scientific value not a few, but many should be so treated, for if decay of teeth is found even in one skull out of one hundred, the fact would be established that the teeth of pre-historic man *were subject to decay*, and further examinations would establish the degree.

3d. Are the majority of human teeth in the present age in a good or bad condition? We need statistics on this subject, for by far the largest number of people who visit a dental office are the class who have bad teeth. They are driven there by necessity, and it takes a great advance in civilization for persons to consult

*The savage is always in a starved or overfed condition; he has no commissariat in war or granaries in peace; badly clothed and wretchedly sheltered, a feast or a famine is his constant lot. The most miserable tramp that ever infested the confines of civilization fares sumptuously in comparison.

a dentist in regard to the condition of their own or their children's teeth, before they suffer pain or inconvenience. So that statistics in regard to the condition of the human teeth, based on what may be seen in a dental office, are of little value, yet most that has been said on the increasing degeneracy of the human teeth has been compiled from the general impressions received by the dentist in the practice of his profession through a series of years; and by careful observation and an increasing practice, he is forced to the conclusion that the human teeth are degenerating. *

I am well aware that a successful practice, coupled with close observation, is entitled to respectful consideration as such, but for scientific purposes touching the degeneracy of the human teeth, an office practice is too limited a field of observation to be of value.

4th. Are the teeth of people living in the United States worse, or more disposed to decay, than the teeth of people living in Europe? It is a common belief that the American's teeth are worse than the European's; and some of our profession, with an industry little short of tyranny, have done much by their writings to foster this belief. They have taken no pains to formulate tables, but collected their statistics from the babblings of home-sick servant girls, and the vaporings of recent emigrants who are hardly naturalized or acclimated before they are afflicted with an "American toothache."†

The same writers give to the American *Indian* a sound set of teeth ("*because he lives in a state of nature*"), and the Mexican and South American were presumed to have good teeth, until the American dentist appeared among them, then they commenced to have bad teeth. It is also stated that the number of dentists in the United States shows a necessity for the dentist that is not felt

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*In a conversation on this subject with a gentleman of excellent standing in the profession, I was asked the innocent question, "How is it, that when I commenced the practice of my profession some thirty years ago I had little to do, but my practice increased from year to year, until now I am overworked, and I find that it is the same with others in the profession?" He was too well satisfied with the explanation that degeneracy furnished, and too modest to attribute his increase of practice to good work and an increasing professional reputation.

†See Essay on the "Cause of the Degeneracy of the Teeth," which appeared in one of the numbers of a small work entitled, "Half-hour Recreations in Popular Science," published by the house of Estis & Eauriat, of Boston, and written by a professor in one of our dental colleges.

in Europe; well, the necessity may exist and not be felt, and the folly of this kind of reasoning will not be exaggerated by the following illustration: A fellow being told that a certain gentleman took a bath twice a week, replied in astonishment, "Well now I had no idea that Mr Jones was so dirty, for I do not find it necessary to take more than one in a year." There can be no doubt that the necessity for the use of soap existed many years before it was compounded, and by far the largest number of human beings now on the face of the earth do not realize the necessity of its use.

5th. Are the teeth of man more prone to decay than those of other animals? The comparative anatomy, arrangement, and development of the teeth of man and other animals will assist in furnishing the answer. The teeth of man are more prone to decay for the following reasons:— 1st. The capsular form of the enamel (of the molars and premolars), leaving interstices between the cusps which form a ready lodgment for foreign matter. 2d. The teeth of man are more compact, they form an unbroken arch, there is no interdental space between the premolars and canines as in other animals; and while the quadrumana resemble man in this particular, there is a marked distinction between the highest order of the Quadrumanes and Man. Owing to the greater length of the canines in the quadrumana there is an interval between the lateral incisors and the canines; with this exception the order of succession and arrangement of the deciduous and permanent teeth, as well as the earlier development of the teeth of the lower jaw, are the same as in man. The size of the teeth in human beings varies, and has no proportionate relation to the size of the body; thus very frequently, small persons have very large teeth, while on the contrary, persons of colossal size may have narrow and small teeth. Large persons usually have large jaws, but the teeth do not correspond to the size of the jaws as often as the jaws correspond to the size of the body, either in large or small persons. There are large jaws with small teeth, and small jaws with large teeth; the latter occurs more frequently in small persons, while the former is of rare occurrence in large persons. This irregularity of development of the teeth and jaws in relation to the body does not appear to exist in any other class of animals For man forms but one genus, and while that genus is the only one of its order, it is divided into many species.

Among the permanent teeth of man, the anterior twenty are permanent succedaneous teeth, as they take or fill the place of the deciduous teeth that are swept away from the superior and inferior maxillaries. The other twelve, which are the posterior, having had no predecessors, are permanent, immutable teeth. Now the eight premolars, while they are preceded by the eight deciduous molars and are classed with the twenty anterior permanent succedaneous teeth, deserve to be considered separately, as they do not resemble their predecessors either in the form of the crown, or the length and number of roots; neither do they occupy as much space as their predecessors. This arrangement, order of succession, and development of the teeth in man does not take place in any other class of animals with the exception of the higher orders of quadrumana.

6th. The longevity of man, as compared with other terrestrial animals, is an important factor in the question under consideration. Man hardly attains his majority when most animals have completed the term of their existence. Aquatic animals as a rule live longer than terrestrial, and fishes appear never to grow old, but seem to enjoy a perpetual youth; and if they lose a tooth by accident it is at once renewed like their scales.

7th. Are animals under domestication more subject to disease of the teeth than wild animals? Of all animals the ruminants are those which are most useful to man. They furnish him with food, and nearly all the flesh that he consumes. Some serve him as beasts of burden, others with their milk, their tallow, leather, horns and other products. This class of animals *cannot exist on anything but their natural food—herbage*; and they have to be in a healthy condition in order to be useful. When cows are stabled and fed on slop by avaricious ignorant men, they become unhealthy and lose their teeth, not by decay (for they do not live long enough), but by a rapid absorption of the alveoli.

The hog, like man, is an omnivorous animal, but when raised for the purposes of food, ought to be fed on vegetables, seeds and grain. Under domestication he lives well and naturally, but dies too young to determine the baneful effects of civilization on his teeth; very few of the animals that are used by man for food are permitted to enjoy but a small portion of their full term of existence. The horse under domestication lives naturally as regards his food,

with this difference: under domestication he receives more grain, and his food is brought to him, and the work that is imposed on him takes the place of the exercise he would have to undergo in a wild state in his search for food. Their teeth wear down with age, and I have never known of a decayed tooth being found in a horse's mouth. Dogs and cats live longer under domestication than the same order of animals in a wild state; they are carnivorous, and owing to the shortness of their intestines are incapable of living on any other kind of food; when old they lose their teeth by absorption.*

From these considerations it appears that domestic animals are better fed, and such as are not used for food by man, live longer than in a wild state; and inasmuch as all animals, with the exception of man, are restricted by their anatomical construction to certain kinds of food, their diet under domestication *is natural*. All animals are incapable of sustaining themselves by forming living matter or protoplasm from the inorganic world, but absolutely need for their subsistence a food consisting of organic matter already formed; with plants it is otherwise, they live upon inorganic matter only. Now the vegetable kingdom draws its food from the mineral kingdom, and the animal kingdom derives its sustenance from the vegetable, either directly or indirectly: directly by the herbivorous animals, and indirectly by the carnivorous; there is nothing more clear than that the consumed must pre-exist the consumer. Now, as all animal tissues are of a more nitrogenous nature than vegetables, and as the nitrogenous compounds in vegetables are found principally in the seeds and fruits of plants, it follows that animals who live on seeds and fruits require more of the nitrogenous compounds, and the alimentary canals of such animals are shorter than the herbivorous and somewhat longer and more complicated than the carnivorous.

8th. Does the habitual use of superfine flour, or the use of any of the cereal grains deprived of their bran or husk, tend to weaken the structure of the human teeth?

The advocates of "feeding the teeth" *on the brown-bread plan* may save much valuable time, and find a solution of the question by considering the chemical properties and construction of a grain of wheat.

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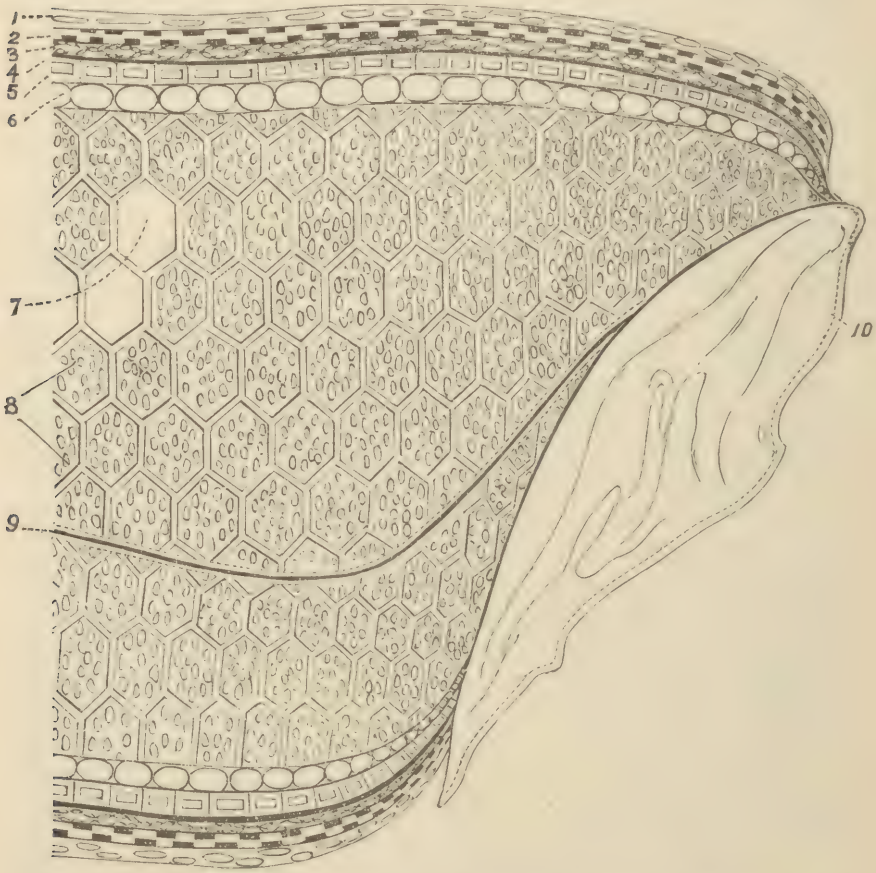
* See "Comparative Longevity in Man and the Lower Animals," by E. Ray Lankester, B. A. London, Macmillan & Co., 1870.

Dr. Taylor asked some questions in regard to the portion of the grain of wheat that contains the largest proportion of the phosphates, and Dr. Patrick in reply gave some description of the structure of the grain, as follows:




LONGITUDINAL SECTION OF A GRAIN OF WHEAT, MAGNIFIED SEVENTY-FIVE DIAMETERS, THE CELLULAR FORMATION TWO HUNDRED AND FIFTY DIAMETERS.

1. First fruit coat.
2. Second fruit coat.
3. Third fruit coat.
4. First seed coat.
5. Second seed coat.
6. Albuminous layer in cells.
7. Hexagonal cells.
8. Cells filled with starch grains.
9. Seam or crease.
10. Germ or seed in which the oleaginous matter of the grain is contained.

Bran proper is the external rind or skin represented by the five coats; it consists of woody fibre or lignine, and is coated with a shining layer of flint or silica, which protects the body of the grain from the action of the atmosphere; and unless its continuity be broken the gastric juices cannot act upon the starch and albuminous matter contained in the cells of the grain. Now the albuminous layer (No. 6) which adheres so tenaciously to the five coats is really the only bone of contention, not only with the miller in a pecuniary sense, but with the brown-bread philanthropists. This albuminous layer is made up of cells, the walls of which are made up of cellulose, and the thicker the cell-wall for the same sized cell, the less nutrition there will be, (for cellulose is indigestible) and that which is contained within these cells is albuminous matter; a nitrogenous compound which is made up of the proteinaceous alimentary principles. This albuminous layer contains no starch grains but holds in its cells from eight to fifteen per cent. of the albuminous matter of the whole body of the grain, for the interovular spaces which surround the starch grains in the hexagonal cells are filled with albuminous matter, and fully eighty-five per cent. of the albuminous matter of the whole grain of wheat is contained in these hexagonal cells. *

Now if the bran, including the albuminous layer, were thrown away, the loss of the nitrogenous matter would be less than fifteen per cent., and the rest of the grain would contain more of the plastic elements of nutrition or the nitrogenous or flesh-forming elements of food than rice or most other grains contain, and the

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*If a quantity of superfine flour be mixed with a quantity of water and kneaded, the particles will cohere and form a smooth, elastic and tenacious dough. If this dough be placed upon a sieve, or on a piece of muslin stretched over a vessel, and worked with the hand under a stream of water, the water will become milky and pass through into the vessel. If this process be continued until the water becomes clear, and the milky water in the vessel becomes clear by standing, a white powder will be found at the bottom of the vessel. This white powder is the common wheaten starch. The white sticky substance that remains upon the sieve or muslin is called gluten, which contains the nitrogenous or tissue-forming elements of the grain; starch being the non-nitrogenous or heat-producing portion of the grain. Starch is found in most organic combinations, and as it is an important article of commerce, extensive manufactories for the production of starch exist in most civilized countries. The principal vegetables from which starch is obtained are—potatoes, maranta-indica, beans, sago palm, Iceland moss, peas, wheat and Indian corn. Now as one hundred parts of wheaten flour yield twenty-five per cent. of gluten, this valuable portion of the grain is not thrown away, but is mixed with a double weight of flour, the paste rolled into long strips drawn into tubes, or made into granules, and is known in commerce as macaroni, sago, and vermicelli. People who use these preparations of vegetable gluten extensively lose the desire for animal food. Query:—If brown-bread will perform wonders in stopping the tendency of teeth to decay, what ought we to expect from the use of macaroni, which is charged with seventeen per cent. more of the "tooth producing elements?"

consumer could very well make up the loss in volume, and then not eat as much of the starches or non-nitrogenous heat-producing elements, as the rice-eating nations do to obtain the same amount of nitrogenous compounds. Now it must be remembered that these tissue-forming elements are not found in the bran or husk of the grain, and the presence of these bran coats in flour impairs its value for food, for a grain of wheat, uncrushed, will pass through the whole length of the alimentary canal unaffected by the gastric juice, so that there is a great waste in using imperfectly pulverized grain of any kind, as the husk or bran partially protects the nutritive portion that adheres to it from the action of the gastric juice; and where the bran acts on the intestines as an irritant, either in a greater or less degree, so does it hasten the passage of the food through the canal in a partially undigested condition. There would therefore be nothing gained in the use of the husks of the grain excepting where a laxative was indicated. Now the ligneous and silicious layers which form the cells and coats of the grain are insoluble, and however fine they may be pulverized, or however perfectly they may be cooked, when eaten either by man or beast, these substances will be found in the excrements of the animal unchanged.

If we had to subsist on eggs alone, we should, in order to satisfy the requirements of nutrition, place ourselves in the position of the chick and consume the shell as well as its contents. *

But inasmuch as our food is made up of a mixture of animal and vegetable, and the vegetable consisting chiefly of seeds, fruits and roots—a class that hold in store large quantities of nitrogenous matter, we can very well spare the husks of wheat, including the albuminous layer, for the nutritive salts contained in our animal food alone would more than compensate their loss. Take for instance the proteine compound of milk (caseine) which contains sulphur, besides the four elements—carbon, oxygen, and hydrogen, and is remarkable for the large quantity of phosphate of lime it holds bound up within it.†

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* The body of a egg contains neither phosphoric acid nor lime, it was necessary therefore, that nature should provide means of furnishing both these substances, which it does at the expense of the shell, which becomes thinner and thinner as the process of incubation progresses, until the living embryo appropriates a sufficient quantity for the formation of its bones. Part of the albumen combines with the shell for this purpose, and another portion forms the feathers.

† If a persistent decomposition of the teeth can be arrested by the use of bran, or shorts, or brown-bread, great caution should be observed in the use of cheese.

And when we reflect that all the animal tissues are evolved from the nitrogenous elements of food (albumen, fibrin, caseine, legumin, and gelatin), it follows that animal food furnishes a larger proportion of the phosphates of magnesia and lime than is found in vegetables.

It is very natural to suppose that the primitive history of so important a plant as wheat would be known, but such is not the case, for its cultivation is of great antiquity; but enough is known of its origin to classify it as one of the primitive grasses of central Europe, and from which all the many varieties have been produced by cultivation. The early history of the many races of people on the continents of Asia, Africa, Malayo-Polynesian, Ancient Mexico, Central America, and Ancient Peru, shows that these people were without wheat. The ancient Britons, at the time of the Roman Invasion, and the many races of men on the North American Continent before the advent of the European, were all strangers to this grain. *

One hundred years ago it was only the wealthiest people in Europe who enjoyed the occasional luxury of wheaten bread, and the masses of the people lived on small allowances of oats and barley; hunger was always present to the minds of the people; even one hundred years ago the United States did not produce enough to make bread for its own people; whereas, we now export annually over 300,000,000 of bushels, a larger quantity than was produced on the entire globe at the time our forefathers were signing the Declaration of Independence; and it is only since we began to export our surplus food that the world has really had enough to eat. The struggle of civilization has been to get rid of the husks, but as time rolls on, the course of events become contradictory, for white bread has become the food of the poor, and brown bread has become the luxury of the rich.

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* "Seeds of wheat retain their vitality from three to seven years; the stories of 'mummy wheat,' which is said to have germinated after remaining thousands of years in the tombs of Egypt, are now discredited; the cunning Arabs have even supplied credulous travelers with mummied maize grains and dahlia tubers, neither of which were known before the discovery of America."—American Cyclopædia, vol. 16, page 587, 1881.

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DISCUSSION.

Dr. Black: The wheat question has been talked over and over, and we ought to understand it pretty well by this time. It has been taught all over the country, that teeth decay because we are civilized. I knew about what we should get from this paper, knowing that Dr. Patrick has been digging some in the old mounds and examining the Indian skulls found in them. I have dug some myself, and when I begun expected to find some very perfect sets of teeth. The first skull that I came across happened to be that of a young woman about eighteen years of age just getting her wisdom teeth. There was not a good tooth in her mouth except the incoming wisdom teeth, and I did not find one perfect set of teeth in all my digging. The opinion that civilization causes decay of the teeth is a fiction. It is not necessarily civilization that causes decay, nor is it probable that it is the kind of food we eat.

Dr. Taft: The paper gives us enough to think about without much discussion, and it might be better to leave it so and not dilute it with our talk. It will attract much attention and provoke discussion when published. I agree with it almost wholly. I do not think that civilization promotes decay of the teeth any more than many other conditions in which men live, but there are circumstances in which we are placed and habits in which we indulge, that are injurious to the teeth. I believe we observe more of the laws of health than any savages ever did, though we

often grossly violate many of them. In respect to ventilation for one thing; our food is often not what is calculated to nourish and promote health, and many habits and circumstances in the case of very many persons are not promotive of health. Health is promoted by regularity in food, exercise, rest, labor, and by correctness of all our daily habits. We can tell by looking carefully over the daily routine of our lives wherein we offend against the laws of health. We ought all to better observe the laws of hygiene.

In many respects we have great advantages over many of the peoples referred to in the paper. We are not subjected to so great changes of temperature; are better protected by clothing and houses, and are not so often served with improper or scanty, or unwholesome food. We are usually well supplied with good materials and ought to prepare our food in the proper form to be readily assimilated.

Savages have some advantages over us. They usually have fresh air and plenty of exercise and sometimes acquire a better developement, but that is not always the case. I apprehend that when the balance is struck it is largely on our side; and we are constantly improving. The laws of health become better and better understood, and many diseases are greatly modified and easily controlled. I believe that there is a gradual and certain improvement in teeth. More attention is given to them and we know better than formerly what care they require.

Dr. Brophy asked Dr. Taft why the Swedes and some other foreigners have so much more trouble with their teeth after coming to this country than while they remain at home?

Dr. Taft: The same is true of the Irish and Scotch. I believe it to be caused chiefly by changes in their food, mode of life, and climate. I have known some of them wish, and long for the food of their native countries. The food there being rougher and coarser, tends to give the teeth exercise and keep them strong. Here they use soft food and much fruit, and they are often negligent of cleanliness, which leads directly to the conditions and diseases which produce decay and destruction of the teeth, gums and processes. I think their remedy would be to maintain as nearly as possible their previous habits of life and forms of food.

Dr. Newkirk: I live near a Swedish settlement and have a good deal to do for them, and I am disposed to question somewhat these statements as to the superiority of the teeth of foreigners who remain in their own country over those who come here. I believe the difference, to a great extent, is only apparent. The attention of most of them has never before been called to their teeth at all, and when it is here, they *think* these organs are after coming much worse than they had been in the old country, but in reality they know very little about it.

They have not been used to dentistry as we have it, and have been in the habit of taking toothache and loss as a mere matter of course. It is according to my observation that the old Swedes, just over from the fatherland, have as bad or worse mouths than those who have grown up in this country.

Dr. Hyde: In 1862 Dr. Forbes said that he had heard that the teeth of the people of Europe were much better than in this country, and when he went over there he took pains to observe. He was surprised to find the teeth of the poorer classes much worse than in this country.

I found the same to be true in regard to the slaves in the South, when down there during the war. The assertions of inexperienced persons in regard to such matters are very little to be trusted.

Dr. Patrick: We can place very little reliance upon what people tell us. Many foreigners have a great love for the old country and are ready to maintain that almost everything was better and more perfect there than here; for instance, "What makes my teeth so much worse than those of my parents? My father and mother have good teeth yet." And I have had the same persons in a few months' time afterwards bring in their fathers and mothers to have full sets of teeth made, and I have found that they had long been destitute of teeth.

If you will take the trouble to examine the teeth of school children, you will perhaps be surprised to find that the great majority are endowed by nature with good teeth, and by far the largest number of mankind will be found to have good teeth up to the age of puberty, if examined.

Dr. Black: There are a great many collections of skulls in this country and Europe, but very few of those who make the collections or take care of them are capable of examining them to ascertain the character of the decay found in the teeth. I think Dr. Patrick ought to examine the collections of skulls in the larger museums in this country with reference to the condition of the teeth found in them, and write a paper on that subject.

Dr. Patrick: There are two or three good collections now in this country; I think some State Society ought to appoint a committee to visit the collection in Philadelphia and perhaps the ones in Washington (Smithsonian Institute) and Cambridge (Peabody Museum of American Ethnology and Archæology) and take time enough to examine and tabulate the condition of the teeth and jaws of all the skulls found there.

It would be useless to ask the curators of the museums mentioned to tabulate the condition of the teeth of skulls under their charge, they are only concerned in the brain capacity and the facial angles of the skulls in their possession; the condition of the teeth of the skulls in these different collections would be much better recorded by a committee appointed by a State Society of dentists than by any other scientific body, for outside of our own profession, it would be next to impossible to find any one to perform the task as it should be, and I am satisfied that any society of dentists who may appoint such committee, will not only reflect honor on themselves, but render an important service to the science of anthropology that has been little thought of.

Dr. Goodrich, of Missouri: My observation is, that Hollanders have far more decayed teeth than Germans from the high lands, and people in malarious districts much more than those living in healthy localities.

Dr. Black: Whenever we find men strong and robust, we find their teeth good as a rule. In Maine, where men grow to be six feet four inches high, their teeth are generally good, etc., etc.

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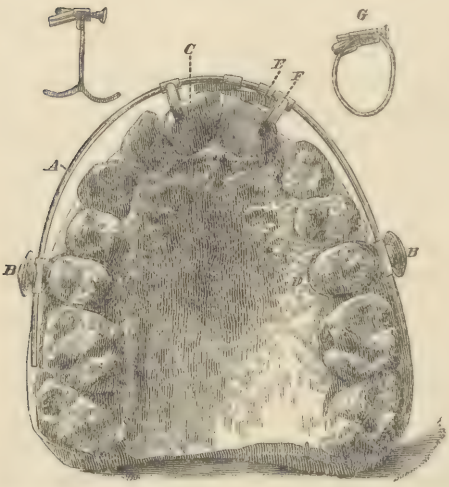
## REGULATING TEETH.

Dr. John J. R. Patrick, of Belleville, exhibited his appliance for regulating teeth and described the method of using it. The

illustration and Dr. Patrick's description give a very clear idea of the instrument, and the wide range of its applications will be readily seen. The same instrument can be used many times in successive cases. In describing the working of the instrument Dr. Patrick said, that the teeth may be likened to pieces of masonry in an arch, if one is out of place the arch collapses, so we construct an arch outside which enables us to support the sides of the broken arch and bring the missing pieces (the misplaced teeth) into their proper places. All that can be said in regard to the action of this instrument on the teeth of the superior is equally applicable to the teeth of the inferior maxillary.

DESCRIPTION OF THE INSTRUMENT.




1st. The body of the instrument is made of half round wire, composed of an alloy of fifteen parts of gold and one of platinum, drawn down *hard* to the required thickness; it may also be made of steel wire in the same manner.

2d. The wire is bent bow-shaped so as to embrace with its flat surface the dental arch; the extreme ends of the wire resting gently on the external lateral surfaces of the first or second molars as the case may require.

3d. The wire is provided with slides which embrace it accurately, so as to move steadily; to these slides different forms of levers are attached, such as wedges, hooks of various lengths and of different elevations and depressions, horizontal hooks, single and double T bars, horizontal loops, and bands.

4th. To two of the slides, which are made longer than the rest, a button is soldered on the external or curved side, which is drilled through, including the slide, and tapped to receive a

screw, which screw is provided with a boss head. To each of the slides that are provided with set screws, a horizontal band is soldered, and these bands, which have been previously fitted to the teeth, furnish, in connection with the slides and set-screws, a ready means of fastening the instrument when in position, and form the fixed points of the arched spring wire.

MODE OF OPERATION.

1st. The *power* is in the elasticity of the bow spring wire (A).

2d. The *fulcrums* are the fixed points (B).

3d. The *resistance* to overcome is the tooth or teeth to be moved (C).

4th. The fulcrums, or fixed points, can be changed without releasing the set screws, as for example, when the horizontal bands (D), which are soldered to the set-screw slides, are designed to embrace the second bicuspids, and the extreme ends of the bow-spring (A) rest on the first molars, if these extreme ends of the bow-spring are bent internally so as to press on the molars, then the second bicuspids become the resistance or the body to be moved; the first molars become the fulcrums, and the power in the bow-spring exerts its greatest influence, for the instrument becomes a lever of the second kind.

5th. When either of the six front teeth projects beyond the arch, and the wedges (E) are brought together so as to bear on either of the projecting teeth; or when the bow-spring without the wedges is forced over them, the pressure is the same. The advantage in using the wedges is to increase the tension from time to time without disturbing the set screws.

6th. When externally projecting teeth are to be moved inwards, the bow-spring is adjusted so that its flat surface touches all projecting teeth, and is then securely fastened by the set-screws and bands, the wedge or wedges are then brought forward and forced together from time to time until the tooth is so moved that they cease to act; the wedges are then separated, the spring taken up and reset firmly by the set-scews. If the bow-spring has a tendency to slip towards the gingiva, one of the slides provided with a hook (F), or one of the wedges provided with a hook, snapped over the cutting edge of a tooth will hold it firmly in place. When, however, the front teeth are outside the arch,

the premolars, as a rule, will be found inside, therefore, in order to widen the arch in a lateral direction, the looped slides (G) should be pressed over the first premolars in addition to the set-screw bands which embrace the second premolars, and the ends of the bow-spring bent against the first molars; this will cause the power to be exerted in the region of the premolars externally, and to a less extent in the region of the incisors internally. (I have found in practice that a waxed silk thread, tied first to any of the lateral teeth, and then firmly tied to the bow-spring, answers the same purpose.)

7th. In cases where the alveoli and palatine process of the superior maxillary are constricted in the region of the premolars and molars, the bow spring wire should be first adjusted so as to touch all the teeth when at rest, then the looped slides, bands, and set screws put in place, the bow-spring placed on the set-screw slides and marked, loops and bands removed, and put in place on the bow-spring; the bow-spring must now be expanded and sprung to its place, when the lateral expansion of the bow-spring will perform its work.

8th. When the premolars and molars are outside the arch (or expanded) the bow-spring should be compressed and secured as before to the expanded teeth, when the constriction of the bow-spring will be found to contain sufficient force to move the teeth to the position desired.

9th. When the anterior teeth (six front) are on the outside of the dental arch, and are to be moved inwards, the length of the bow spring must be *taken up* from time to time (by sliding back), and reset by the set-screws.

10th. When the teeth to be moved (anterior ones) are inside of the dental arch the bow-spring must be *let out* (by sliding forwards) from time to time and reset by the set-screws; and these changes can be made without removing the instrument from the mouth, as the teeth and instrument can be kept clean by the brush without removal.

11th. *All that has been said in the relation of this instrument to the superior maxillary, is equally applicable to the inferior maxillary.*

*In every instance where teeth are moved they should be moved slowly, and held firmly in their cells, and for a sufficient length of*

*time in their new positions for the walls of the dental cells, and the walls of the dental septa to exude callous.*

*As one cell wall is absorbed by the pressure of the tooth against it in shifting, the opposite wall exudes callous, thereby forming a new cell for the changed position of the tooth. For the dental cells grow, and are adapted to the form and size of the roots; and whatever position a tooth may chance to take, there the cell walls will be found molded to the form of the tooth.*

In moving either of the six front teeth (either internally or externally) laterally, more time is required than when the movement takes place from the anterior to the posterior, as the dental septa receives the pressure, which includes not only the cell wall of the tooth to be moved, but the cancellated bone of the septa and the cell wall of the neighboring tooth, and the difficulty increases from the first bicuspid to the molars; the bicuspids having two fangs connate, and the molars three fangs with their separate cells and *cell septa.*

In moving either of the six front teeth from the anterior to the posterior, more time is required than in moving from the posterior to the anterior, for the reason the outer wall of the alveoli of the superior maxillary is thinner and more flexible than the inner.

The conditions which govern the moving of the six front teeth of the superior maxillary apply equally to the corresponding teeth of the inferior; but from the second (and sometimes the first) bicuspid to the last molar, the internal wall is thinner and more flexible than the external, which is re-inforced by the external oblique ridge in addition to a thicker alveoli wall.

I have found in practice, that in shifting a tooth, a little inflammation, if not carried too far, is desirable, and lancing the gingiva on the side of the tooth where the pressure is produced, and where the absorption is taking place relieves the interrupted circulation, and thereby quickens the progeneration of new tissue.

DISCUSSION.

Dr. Talbot, with the help of a blackboard illustration, directed attention to a case in which the arch is broken on both sides by the loss of two or more bicuspids, and the tooth to be moved is firmer in its socket than the one which must be used as

a fixed point or fulcrum, and raising the question, how to prevent moving the wrong tooth with this instrument. Said he thought it could only be done by taking measures to induce inflammation in the socket of the tooth to be moved, by which means it would become less firm than the one to be used as a support or fulcrum for moving it.

Dr. Sturgiss: I have given more attention to irregularities than to almost any one thing. The spring of the arched wire can be made an important support against displacement of the molars or bicuspids used as fixed points. I had a case of displacement by thumb-sucking in which I had to move all the anterior teeth backward, and I became familiar with the forces and effects involved in such cases. The cuspid teeth are very hard to move, and require four times the amount of force needed to move a lateral incisor. The principles involved in these cases are strictly mechanical, and my experience is, that a molar will not afford resistance enough to move a cuspid tooth.

Dr. Eames: "The proof of the pudding is in the eating thereof," and I know (with due respect to Dr. Talbot) that a tooth in similar circumstances to the one described by him can be moved by this appliance, and without inflammation, having done it.

Dr. Brophy: I do not believe that teeth can be moved without congestion of the pericementum which is one of the stages of inflammation.

Dr. Eames: The physiological processes involved may be analogous to inflammation, but it is not necessary that they should pass the bounds of healthy action, that is to say, the absorption in advance of a moving tooth *may* be a physiological and not a pathological process, and the filling up of the socket behind the moved tooth, or the filling of the socket of an extracted tooth, *must* be a physiological process if healthy tissue is formed.

Dr. Black: If inflammation is *necessary* to the filling up of these sockets behind moving teeth, it must be necessary to the building up of bones any where, and *growth* of the bones of children must be an inflammatory process, which is an absurd conclusion. The action involved in moving teeth is not necessarily so violent as to be properly characterized as inflammatory.

*Absorption* in the case of moving teeth *may* be a pathological process or a physiological one, but the *deposition* of bone will generally take place under physiological conditions. I will not say that pathological deposition *may* not take place, but both the absorption and deposition of bone in the sockets of moving teeth should be kept within the bounds of physiological action if possible.